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| **ITU – Telecommunications Standardization Sector**  STUDY GROUP 21 Question 6/21  **Video Coding Experts Group (VCEG)**  76th Meeting: 27 March – 4 April 2025, by teleconference | Document VCEG-BX24-v1 |

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| Question: | 6/21 (VCEG) | | |
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| Title: | **CE description for H.BWC** | | |
| Purpose: | CE description | | |

**Abstract**

This document contains the core experiment description for H.BWC.

1. **CE on wavelets**

This CE is a continuation of the previous CE-1.1 which tests the use of the discrete wavelet transform, as initially proposed in VCEG-BW04.

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|  | Configuration | Test |
| CE-1.1 | CTC | Discrete wavelet transform |

1. **CE on deblocking**

In VCEG-BW12, an illustration of the perceptual benefit of the deblocking approach was provided but it was recently observed that the deblocking causes some degradation in BD-rate performance.

In VCEG-BX13, an improved variant of the deblocking approach was proposed, which maintained the perceptual benefit while reducing but not eliminating the previously noted BD-rate degradation.

Therefore, the following core experiment (CE) on improved deblocking for biomedical waveform coding, based on the method described in VCEG-BW12 as well as VCEG-BX13, is being proposed.

**Technical approach**

\* improvement of deblocking approach by modification of processing and encoder optimization

**Evaluation methods**

\* subjective informal visual assessment by inspection of decoded waveforms at the July meeting

\* objective assessment as cross-check by calculating BD-rates; only minimal loss is acceptable.

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|  | Configuration | Test |
| CE-2.1 | CTC | Deblocking of VCEG-BX13 |

1. **CE on CABAC adaptions, particularly for large block-sizes**

In this CE, called CE-3, the modifications to the context modeling proposed in VCEG-BX15 are tested according to the CTC. Since it is asserted in VCEG-BX15 that the proposed changes are mainly designed for larger blocksizes, besides testing against the CTC anchor, tests are also carried out within a “large blocksize” setting, where the codec is restricted to operate on blocksize 2048. This means that in the configuration files, for test and anchor, one sets: --LOG2\_MAX\_BLOCK\_SIZE=11, --MAX\_SPLIT\_DEPTH=0, --MIN\_SPLIT\_DEPTH\_FULL\_TEST=0

**Tests of CE-3**

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|  | Configuration | Test |
| CE-3.1 | CTC | Context modeling of VCEG-BX15 |
| CE-3.2 | Large blocksize | Context modeling of VCEG-BX15 |

# CE on unification of entropy coding methods

In this CE, called CE-4, it is tested to use CABAC entropy coding also in the LMS branch, as proposed in VCEG-BX14. Here, the three quantization options simple scalar quantization, RDOQ and TCQ are always tested in individual tests.

In order to assess this change more carefully, besides testing against the CTC anchor, tests are also carried out within an “LMS only”-setting. This means that in the configuration files for test and anchor, one always sets:

--CodecMode=1,--LOG2\_MAX\_BLOCK\_SIZE=11,--MAX\_SPLIT\_DEPTH=0.

Finally, combinations with the proposed context modelling changes of CE-3 are also tested, since the intention of the proponents of CE-3 was mainly to cover the CE-4 scenario.

**Tests of CE-4**

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|  | Configuration | Test: CABAC replacing Huffman and: |
| CE-4.1.1 | LMS-only | simple quantization |
| CE-4.1.2 | LMS-only | simple quantization, CABAC changes of CE-3 enabled |
| CE-4.2.1 | LMS-only | RDOQ |
| CE-4.2.2 | LMS-only | RDOQ, CABAC changes of CE-3 enabled |
| CE-4.3.1 | LMS-only | TCQ |
| CE-4.3.2 | LMS-only | TCQ, CABAC changes of CE-3 enabled |
| CE-4.4.1 | CTC | simple quantization |
| CE-4.4.2 | CTC | simple quantization, CABAC changes of CE-3 enabled |
| CE-4.5.1 | CTC | RDOQ |
| CE-4.5.2 | CTC | RDOQ, CABAC changes of CE-3 enabled |
| CE-4.6.1 | CTC | TCQ |
| CE-4.6.2 | CTC | TCQ, CABAC changes of CE-3 enabled |

# Combination of LMS and block based prediction

In this CE, called CE-5, it is tested to apply the LMS prediction mode in combination with CABAC entropy coding on the prediction residual, as proposed in BX-14. It is also tested to enable the proposed CABAC entropy coding changes of CE-3 within this setting, since these changes were reportedly designed for this application.

**Tests of CE-5**

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| . | Configuration | Test: CABAC replacing Huffman and: |
| CE-5.1.1 | CTC | simple quantization |
| CE-5.1.2 | CTC | simple quantization, CABAC changes of CE-3 enabled |
| CE-5.2.1 | CTC | RDOQ |
| CE-5.2.2 | CTC | RDOQ, CABAC changes of CE-3 enabled |
| CE-5.3.1 | CTC | TCQ |
| CE-5.3.2 | CTC | TCQ, CABAC changes of CE-3 enabled |

Further tests of CE-5.1.2, CE-5.2.2, CE-5.3.2 with faster encoder settings which could be different for different signal categories will also be conducted.

# Test plan

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| CE-Test | Tester | Crosschecker |
| CE-1 | Philips | HHI |
| CE-2 | HHI | Philips |
| CE-3 | HHI | Dolby |
| CE-4 | HHI | Dolby |
| CE-5 | HHI | Dolby |

The tests are to be conducted before the next meeting.

**References**

[1] VCEG, “Reference software for biomedical waveform data compression,” tag BWC-1.0. 🌍: <https://vcgit.hhi.fraunhofer.de/vceg-sw/bwc/-/tags>, presets *combined...cfg* in directory*bwc/cfg*

[2] J. Pfaff, C. Fersch, and Rapporteur Q6/21, “Common test conditions and evaluation procedures for H.BWC technical experiments,” *ITU-T document SG21-TD68/WP3*, Geneva, Jan. 2025. 🌍: <https://www.itu.int/wftp3/av-arch/video-site/2501_Gen/T25-SG21-TD-WP3-068-BWC-CTC.docx>

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